MAT 4930 | Special Topics in Mathematics: MATH METH PS & EG 1

Class Number: 13050

Fall 2026

Delivery Method: Primarily Classroom
M/W/F | Period 10 (05.10 PM-06.00 PM) Little Hall 0205

Instructor Information

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Office Hours
LIT 464/LIT 205 MWF after the lecture
Preferred Method of Communication: email

Office Location

LIT 464

Course Details

Catalog Description: Qualified undergraduates take part in seminars or classes on special topics.
Pre- and Co-Requisites: Prereq: undergraduate coordinator permission.
Credit Hours: 1-3
Course Fees: $0.00

Additional Course Description

The course follows: **Distributions and Operators for Physicists** by Sergei V.

Shabanov. The text will be made available for free to all students.

Topic 1: Review of Integration Theory. Functions in Euclidean spaces. Review of the Riemann integration theory in Euclidean spaces. Absolutely and conditionally convergent improper integrals. Line and surface integrals. Divergence theorem and integration by parts in Euclidean spaces. The Lebesgue theory of integration. The space of Lebesgue square integrable functions. Lebesgue integrals depending on parameters. Integration and differentiation with respect to parameters. Potential type integrals and Gaussian integrals. Improper Lebesgue integrals depending on parameters.

Topic 2: The theory of distributions (the main part of the course). Test functions and linear functionals on them. Distributions. Regular distributions vs ordinary functions. Dirac delta-functions and other singular distributions. Distributional extensions of singular functions. Transformations of distributions as the adjoint transformation of test functions. Calculus with distributions. Relations between classical and distributional derivatives. Series with distributional terms. Periodic distributions. The Poisson summation formula. Direct product and convolution of distributions. Tempered distributions. Fourier transform of tempered distributions.

Topic 3: Distributional solutions to linear differential equations and Green's functions. Basics equations of mathematical physics and their distributional solutions. Fundamental solutions for linear differential operators (Laplace, Helmholtz, wave, heat, and Schroedinger operators in various dimensions). Finding a fundamental solution by the Fourier method. Causal Green's functions and the Cauchy (initial value) problem for basic equations of mathematical physics (heat, wave, and Schroedinger equations). Wave potentials and wave propagation in various dimensions. Green's function for a Helmholtz operator satisfying Sommerfeld radiation conditions and applications to wave scattering (time permitted).

Required Materials

The instructor has stated that there are no items required or recommended for this section.

Course Goals and Objectives

The aim of the course to teach basics mathematical skills which are necessary for analytical calculations and analysis of physics theories and mathematical models in

engineering, especially calculations involving distributions, Green's functions, and distributional solutions to equations of mathematical physics. The course is especially useful for students specializing in theoretical and mathematical physics, and engineering disciplines using partial differential equations.

Expectations and Student Learning Outcomes

Students are expected to become familiar with applications of the Lebesgue integration theory, the concepts of the theory of distributions and applications to basic equations of mathematical physics

Methods of Evaluation

Graded assignments: There will be 3 graded homework assignments and 3 short quizzes in class. The quizzes contain only True-False questions and meant to test basic knowledge of definitions and theorems covered in lectures. They will be given shortly before or right after a release of each homework assignment. Submission of homework assignments is via Canvas. All assignments are due in a week or so after they are open in Canvas. They are free-response.

Each homework assignment contains some number of problems and each problem is worth a point if solved correctly. If N is the total number of assigned problems and M is the total number of points earned, then your current score is G=100(M/N) rounded to the nearest integer. The grade thresholds are given below. The quiz average is calculated by the same rule for all three quizzes but does not contribute to G directly.

Rule: If the quiz average is less than 80 (or 70), the course grade is capped by A- (or B+), even if the total score G is above 90 (or 80). Quizzes have no other effect on your grade. Their sole purpose is to limit a possible effect of online resources on your grade.

Extra credit: An extra credit problem will be added to each assignment. It does not increase N, but it would increase M if solved correctly.

Grading Scale

Letter grade and percentage

Letter	Percentage Value
A	90% and above
A -	85 - 89%
B +	80 - 84%
B	75 - 79%

Letter	Percentage Value
B -	70 - 74%
C +	65 - 69%
C	60 - 64%
C -	55 - 59%
D +	50 - 54%
D	45 - 49%
D -	40 - 44%
E	39% and below

Course Schedule

The course has 3 meetings per week as indicated above. Homework assignments will be released and collected via Canvas.

HW1 is released at the end of September or early October

HW2 is released in early November

HW3(Final) is released on the last week of classes

Exact dates will depend on the progress of lectures and posted in the course page a week before the release. Quizzes will be given around the release date. No specific date will be given!

University Policies and Resources

Information about grading policies, support for students with disabilities, course evaluations, the Honor Code, and other course policies and campus resources can be found on the Syllabus Policies page.

Attendance Policy

Excused and Unexcused Absences

Students may only participate in classes if they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first-class meeting.

Acceptable reasons for absence from or failure to engage in class include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena). Other reasons (e.g., a job interview or club activity) may be deemed acceptable if approved by the instructor.

For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. For all unplanned absences because of accidents or emergency situations, students should contact their instructor as soon as conditions permit.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during absence from class or inability to engage in class activities because of the reasons outlined above.

If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and they have not contacted the department to indicate their intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory.

The university recognizes the right of the instructor to make attendance mandatory and require documentation for absences (except for religious holidays), missed work, or inability to fully engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Religious Holidays Guidelines

At the University of Florida, students and faculty work together to allow students the opportunity to observe the holy days of their faith. A student should inform the faculty member of the religious observances of their faith that will conflict with class attendance, with tests or examinations, or with other class activities prior to the class or occurrence of that test or activity. The faculty member is then obligated to accommodate that particular student’s religious observances. Because students represent a myriad of cultures and many faiths, the University of Florida is not able to assure that scheduled academic activities do not conflict with the holy days of all religious groups. Accordingly,

individual students should make their need for an excused absence known in advance of the scheduled activities.

The Florida Board of Education and state law govern university policy regarding observance of religious holidays.

Guidelines

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that they have been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Absence due to Illness

A student who is absent from class or any required class-related activity because of illness should contact their instructor, if feasible, as early as possible prior to the missed class or activity.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during an excused absence.

Students should contact their college by the deadline to drop a course for medical reasons. Students can petition the Dean of Students Office to drop a course for medical reasons. The university's policy regarding medical excuse from classes is maintained by the Student Health Care Center.

Twelve-Day Rule

Students who participate in university-sponsored athletic or scholarly activities are permitted to be absent 12 scholastic days per semester without penalty. A scholastic day is any day on which regular class work is scheduled as defined in the approved university calendar. More Info

The student or student's advisor must notify the instructor as early as possible prior to the anticipated absence to allow ample time for accommodations. Instructors must be flexible and not penalize students when re-scheduling during-term and final exams, class assignments, and other required activities and must follow the UF Attendance Policy herein and UF Examination Policies. As noted in the UF Examination Policies, during-term exams should be re-scheduled no later than before the end of the semester, while final exams no later than 90 days after the originally scheduled exam time. However, instructors are encouraged to re-schedule final and during-term exams, assignments, and other activities as soon as possible after the last day of the absence and must not penalize the student in any way. More Info

A group's schedule that requires absence of more than 12 scholastic days should be adjusted so that no student is absent from campus more than 12 scholastic days. Students who previously have been warned in writing by their instructor about the impact of absences on their individual class performance should not incur additional absences, even if they have not been absent 12 scholastic days. The student is responsible to maintain satisfactory academic performance and attendance.

Course Policies and Resources

Attendance: No credit for attendance. But a regular attendance is strongly recommended. If you miss a class meeting, read the topic in the textbook. The lecture topics will be posted in the course page. Also, quiz dates are not announced. Attendance shortly before and after the release of a HW is practically mandatory.

Special accommodation (DRC testing): Students requesting special accommodation for exams must first register with the Dean of Student Office. The Dean of Student Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation and follow instructions in the above link.

Student honor code: Zero tolerance to any kind of cheating on graded assignments. If caught cheating, the course grade is an F, no exception.

Late and Make Up Work Policy

Make-ups: Make-ups for a missed quiz only with written medical excuse.

Classroom Behavior

You can come and leave the class at any time. Just do so without disturbing or interrupting the class (e.g. without saying “hi” or “by” to anyone). If you come to a class meeting, put your phone away and work. Questions during the lectures are more than welcome.